

I can only, then, again assure my friend Mr. Butler that, because I do not support his charge against the Felders, I do not necessarily bring one against him; and he will probably agree with me that the whole of this unsavoury discussion is detrimental to the cause of even descriptive entomology, and affords further proof of the injury done to the same by personal competition.

*On some Experiments in Hybridization between different Species of Echinoidea.* By M. R. KÖHLER.

Experiments on the hybridization of Echinoderms have been hitherto but few in number. In 1873 M. Marion published ('Comptes Rendus,' April 14) an account of fecundations effected between *Strongylocentrotus lividus* and *Sphærechinus granularis*, which resulted in the production of perfectly developed Plutei. A year later Agassiz announced, in the 'Archives de Zoologie Expérimentale,' a case of hybridization between two species of the genus *Asteracanthion*, in which the larvæ attained the stage of Bipinnaria. At the suggestion of M. Marion I have resumed these experiments in the laboratory of marine zoology at Marseilles; and their results possess some importance in connexion with the physiology of the species, which was, indeed, indicated by M. Marion in his note presented to the Academy. These new experiments in hybridization have been extended to several species of regular and irregular sea-urchins. I cannot here give a complete analysis of these fecundations, which will be studied in detail in my memoir on the Echinoidea of the shores of Provence. I shall therefore content myself with indicating the definitive results at which I have arrived.

In March and April the products of the genital glands in most of the species of Marseilles have generally arrived at maturity; nevertheless it is not unusual to meet with individuals of which the ovules or spermatozooids, still immature, are unfit for any attempt at fecundation. It is therefore indispensable to precede each experiment by a microscopic observation. It is equally important to make, in parallelism with each crossed fecundation, a direct fecundation under the same conditions, and with products belonging to the same individuals, for the purpose of arriving at comparable results, both as to the state of the larva and the time it takes to arrive at a definite stage in both cases.

The following is a list of the experiments made, with the results obtained in the most successful fecundations:—

*Strongylocentrotus lividus* ♀ and *Sphærechinus granularis* ♂.—Pluteus regularly and perfectly developed.

*Id.* and *Psammechinus pulchellus* ♂.—Pluteus always well developed.

*Id.* and *Dorocidaris papillata* ♂.—The ova, of which a very small number were fecundated, did not pass the blastula stage. (It is true the only living *Dorocidaris* I had at my disposal had been captured some time, and its spermatozooids were not very active.)

*Strongylocentrotus* ♀ and *Spatangus purpureus* ♂.—Many negative experiments; fecundation, however, is possible, but the fecun-

dated eggs are always few in number. Nevertheless they arrive at the blastula stage, or sometimes the gastrula with a shallow invagination.

*Strongylocentrotus* ♂ and *Sphærechinus* ♀.—The larvæ do not pass the blastula stage.

*Id.* and *Psammechinus* ♀.—Plutei normally and perfectly developed.

*Id.* and *Spatangus* ♀.—All the ova become regularly segmented. I have never seen them attain the Pluteus stage; they do not pass the stage of perfect gastrula, with a gastric cavity and calcareous spicules on each side of the mouth.

*Psammechinus* ♀ and *Sphærechinus* ♂.—The larvæ always stopped at the gastrula stage, with the gastric invagination not deep.

*Id.* and *Dorocidaris* ♂.—No appearance of segmentation. (The same observation applies to both *Dorocidaris* and *Strongylocentrotus*.)

*Id.* and *Spatangus* ♂.—A few ova were segmented and attained the blastula stage.

*Psammechinus* ♂ and *Spatangus* ♀.—In all the experiments all the ova attained the stage of Plutei, and these lived for several days. The development takes place comparatively very slowly; thus, the hybrid larvæ are still in the gastrula state when the larvæ, obtained by direct fecundation under the same conditions, have attained the Pluteus stage a day or two. Moreover the form of the Pluteus presents some peculiarities; the arms are shorter and stouter, and the contours are less regular than in the normal Plutei of *Spatangus*; the calcareous skeleton also presents differences. Even in the gastrula we observe peculiar characters, the pigmentation being much less abundant in the gastrulæ produced by crossed fecundations.

*Psammechinus* ♂ and *Sphærechinus* ♀.—A small number of ova become segmented, but do not pass the blastula stage.

Crossed fecundations therefore are possible between different species of Echinoidea, and that between very wide limits. There is certainly at least as much difference between a *Spatangus* and a *Psammechinus* as between two mammals belonging to two allied orders. And if the Plutei obtained by crossing between regular Echinoids do not appear to differ much from the legitimate Plutei of the type functioning as female in the experiments, there are certainly well marked differences between a legitimate Pluteus of *Spatangus* and a hybrid Pluteus of *Spatangus* and *Psammechinus*.

I must, in conclusion, call attention to one fact:—Because the ova of a species when fecundated by the spermatozoids of another species arrive at the state of Pluteus, it does not follow that the converse is true. Thus the ovules of *Spatangus* are perfectly fecundated by the spermatozoids of *Psammechinus*; but the ovules of the latter, subjected to the influence of the semen of *Spatangus*, remain for the most part intact, while the rest scarcely reach the blastula stage.—*Comptes Rendus*, April 24, 1882, p. 1203.

*On Variation in the Nest-forms of the Furrow-Spider (Epeira strix).* By the Rev. Dr. H. C. McCook.

The author had observed that some of the orb-weaving spiders have a marked tendency to vary the forms of their nests. The